THE BLIND FISHES OF THE MAMMOTH CAVE AND THEIR ALLIES[*]

THE blind fish of the Mammoth Cave has from its discovery been regarded with curiosity by all who have heard of its existence, while anatomists and physiologists have considered it as one of those singular animals whose special anatomy must be studied in order to understand correctly facts that have been demonstrated from other sources ; and, in these days of the Darwinian and development theories, the little blind fish is called forth to give its testimony, pro or con.

Before touching upon this point, however, we must call attention to the structure of the fish and its allies, and to others that are either partially or totally blind.

In the lancelet (*Branchiostoma*) and the hag (*Myxine*) the eye is described "as simple in form as that of a leech, consisting simply of a skin follicle coated by a dark pigment, which receives the end of a nerve from the brain." Such an eye speck as this structure gives would only answer for the simple perception of light. In the young[†] of the lampreys (*Petromyzon*) the eye is very small and placed in a fold of the skin of the head, and probably of little use, as these young remain buried in the sand ; but as they attain maturity, and, with it, the parasitic habits of the adult, their eyes are developed to a fair size, thus reversing the general rule in the class.

In most other fishes the eyes are developed to a full and even remarkable extent as to size and perfection of sight in water. In *Anableps*, or the so-called four-eyed fish of the fresh waters of Central and South America, which belongs to a closely allied family with our blind fish, the *Cyprinodontidæ*, the eyes are not only fully developed, but are divided into an upper and lower portion in such a way, by an opaque horizontal line, as to give the effect of two pupils, by which the fish probably sees as well when following its prey on the surface with its eyes out of water, as when under water. But it is in the interesting family of Cat fishes (*Siluridæ*) that we find the most singular arrangement of eyes in perfect adaptation to the diversified modes of life of the numerous species. In this family the eyes assume nearly every possible modification from partial and even total blindness to perfectly developed eyes, and these organs are placed in almost every conceivable position in a fish's head ; from the ordinary large eyes on the side, to small ones on top of the head, enabling the fish to see only what is above ; to the oval eyes on the side, in some just back of the mouth, situated in such a way that the fish can only see what is in close proximity to its jaws or even below them. Many genera of this family found in South America,[‡] Africa,[§] and Asia,[||] have the eyes so small and buried under the skin, or protected by folds or cartilage, as evidently to be of no more use than simply to distinguish light from darkness.

Among the most interesting forms of this family, in this respect, is the genus described by Prof. Cope under the name of *Gronias nigrilabris*. This fish is very closely allied to our common bull pout or horned pout, and of about the same size (ten inches in length). It was taken in the Conestoga river in Lancaster Co., Pennsylvania, where it is "occasionally caught by fishermen and is supposed to issue from a subterranean stream said to traverse the limestone in that part of Lancaster Co., and discharge into the Conestoga." We quote the following from Prof. Cope's remarks on the fish :[*]—

"Two specimens of this fish present an interesting condition of the rudimental eyes. On the left side of both a small perforation exists in the corium, which is closed by the epidermis, representing a rudimental cornea ; on the other the corium is complete. Here the eyeball exists as a very small cartilaginous sphere with thick walls, concealed by the muscles and fibrous tissue attached, and filled by a minute nucleus of pigment. On the other the sphere is larger and thinner walled, the thinnest portion adherent to the corneal spot above mentioned ; there is a lining of pigment. It is scarcely collapsed in one, in the other so closely as to give a tripodal section. Here we have an interesting transitional condition in one and the same animal, with regard to a peculiarity which has at the same time physiological and systematic significance, and is one of the comparatively few cases where the physiological appropriateness of a generic modification can be demonstrated. It is therefore not subject to the difficulty under which the advocates of natural selection labour, when necessitated to explain a structure as being a step in the advance towards, or in the recession from, any *unknown* modification needful to the existence of the species. In the present case observation on the species in a state of nature may furnish interesting results. In no specimen has a trace of anything representing the lens been found."

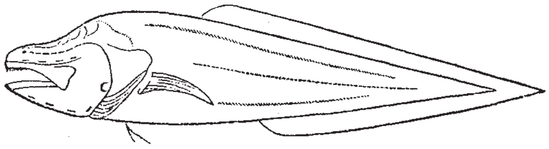

FIG. 1.—Cuban Blind Fish : Lucifuga subterraneus.

When we remember that the lens of the eye in *Amblyopsis* has been found, even though the eye is less developed in all its parts than in *Gronias*, it is probable that a careful microscopical examination would show its existence in this genus also.

It is interesting to note that this fish is black above (lighter on the sides and white below), notwithstanding its supposed subterranean habits, and that all the other members of the family having rudimentary or covered eyes are also dark coloured, while the blind fishes of the Mammoth Cave and of the caves in Cuba are nearly colourless. This want of colour in the latter fishes has been considered as due to their subterranean life. If this be the cause, why should the blind cat-fishes retain the colours characteristic of the other members of the family living in open waters?

The fishes which in a general way, so far as blindness, tactile sense, and mode of life are concerned, come the nearest to the blind fishes of the Mammoth Cave, are those described by Prof. Poey[†] under the names of *Lucifuga subterraneus* and *L. dentatus*.[‡] These fishes having the broad, flattened, fleshy head, with minute cilia, without external eyes, and inhabiting caves so similar in structure to the Mammoth Cave, make a comparison of them with the fishes of the Mammoth Cave most interesting. This is greatly enhanced by the fact that the Cuban fishes belong to a family of essentially marine habit, quite far removed from *Amblyopsis.* The fresh water ling (*Lota*), belonging to the same great group of fishes (though to a distinct family or sub-family) containing the cod on the one hand and the Cuban blind fish on the other, is probably the nearest fresh water relative of the Cuban fish, but the nearest representative yet known is the marine genus *Brotula*, one species of which is found in the Carribean Sea.

---

[*] Reprinted from the *American Naturalist*, a sequel to "The Blind Crustacea of the Mammoth Cave." See NATURE, vol. v. pp. 445, 484.

[†] These young lampreys have been described under the generic name of Ammocœtes, and it was not until 1856, when Prof. Müller discovered the fact of a metamorphosis in the lampreys, that their true position was ascertained. Prof. Müller has traced the history of the common European species, and shown that it is three or four years in attaining its perfect form. With this fact before us and with the early stages of the Myxinoids still unknown, have we not some reason for suspecting that the lancelet may yet prove to be a larval form of the Myxinoids, notwithstanding that it is said to lay eggs? Why should we not suspect the existence in the very lowest vertebrates of something akin to alternate generations, or of larvæ capable of reproduction? Without having any facts to support such an assumption, except that, on general principles, the young of Myxine would probably be very much like Branchiostoma, and that its young is not known, while Branchiostoma has only been found in waters where some species of Myxinoid exists, I think that before the position of the lancelet is firmly established, we must know the embryology of the Myxinoids ; for should the lancelet prove not to be the young of the Myxinoids, it must necessarily form a distinct class of animals, perhaps as near to the molluscs as to the vertebrates.

[‡] *Pimelodus cyclopium* of Humboldt, *Helogenes*, *Agoniosus* and other genera.

[§] *Eutropius congensis*.

[||] *Ailia*, *Shilbichthys*, *Bagroides*, and other genera.

[*] Proceedings of the Academy of Natural Sciences of Philadelphia for 1864, p. 231.

[†] Memorias sobre la Historia Natural de la Isla de Cuba, por Felipe Poey. Tomo 2, pp. 95-114. Pls. 9, 10, 11. Habana, 1856-8.

[‡] This species was afterwards referred to the genus *Stygicola* Gill, on account of the presence of palatine teeth which are wanting in the other species. There are also several other good characters, to judge from the figures of the head, skull, and brain given by Poey, that would warrant the reference of the fish to a distinct genus from *L. subterraneus*.

In the Cuban blind fish we find ciliary appendages on the head and body quite distinctly developed, evidently of the same character as those of *Amblyopsis*, and answering the purpose of tactile organs. These cilia are in the form of small but plainly visible protuberances (reminding one of the single fleshy protuberance over the opercular opening just back of the head in *Amblyopsis*). There are eight of these on top of the head of a specimen I hastily examined, received from Prof. Poey by the Museum of Comparative Zoology, and quite a number arranged in three rows on each side of the body, showing that tactile sense is well developed in this fish: though it is rather singular that the barbels on the jaws, so usually developed as organs of touch in the cod family and its allies, are entirely wanting in this fish.

The brain of *Lucifuga subterraneus*, as represented by the figures of Poey, differs very much from that of *L. dentatus* and of *Amblyopsis.* In all, the optic lobes are as largely developed as in allied fishes provided with well developed eyes. In *Lucifuga subterraneus* the cerebral lobes are separated by quite a space from the round optic lobes, which are represented as a little larger than the cerebral lobes, and also of greater diameter than the cerebellum; this latter being more developed laterally than in either *L. dentatus* or *Amblyopsis.* The three divisions of the brain are represented, from a top view, as nearly complete circles (without division into right and left lobes), of which that representing the optic lobes is slightly the largest. In *L. dentatus* the procencephalon and the optic lobes are represented as divided into right and left lobes, as in *Amblyopsis*, and the cerebellum does not extend laterally over the medulla oblongata as in *L. subterraneus*, but, as in *Amblyopsis*, is not so broad as the medulla, and, projecting forwards, covers a much larger portion of the optic lobes than is the case in *L. subterraneus.*

The Cuban blind fish has the body, cheeks, and opercular bones covered with scales. As in *Amblyopsis*, the eyes exist, but are so imbedded in the flesh of the head as to be of no use. The outline cut here given (Fig. 1), copied from Poey, is very characteristic of the form of the fish, but does not exhibit the fleshy cilia or details of scaling.

The first notice that I can find of the Mammoth Cave blind fish is that contained in the "Proceedings of the Academy of Natural Sciences of Philadelphia," vol. i. p. 175, where is recorded the presentation of a specimen to the Academy by W. T. Craige, M.D., at the meeting held on May 24, 1842, in the following words:—

"A white, eyeless crayfish (*Astacus Bartoni?*) and a small white fish, also eyeless (presumed to belong to a sub-genus of *Silurus*), both taken from a small stream called the River Styx in the Mammoth Cave, Kentucky, about two and one-half miles from the entrance."

Dr. DeKay, in his "Natural History of New York Fishes," p. 187, published in 1842, describes the fish, from a poor specimen in the Cabinet of the Lyceum of Natural History of New York, under the name of *Amblyopsis*[*] *spelæus.*[†] De Kay's description is on the whole so characteristic of the fish as to leave no doubt as to the species he had before him, though the statement that it has eight rays supporting the branchiostegal membrane (instead of six), and that the eyes are "large" but under the skin, must have been due the bad condition of his specimen, and to his taking the fatty layer covering the minute eyes for the eyes themselves, as pointed out by Prof. Wyman. Dr. DeKay places the genus with the Siluridæ (cat-fishes), but at the same time questions its connection with the family, and says that it will probably form the type of a new family. In 1843 Prof. Jeffries Wyman[*] gave an account of the dissection of a specimen in which he could not find a trace of the eye or of the optic nerve, probably owing to the condition of the specimen, as he afterwards[†] found the eye spots, and made out the structure of the eye. When describing the brain, Prof. Wyman calls attention to the fact of the optic lobes being as well developed as in allied fishes with well developed eyes, and asks if this fact does not indicate that the optic lobes are the seat of other functions as well as of that of sight. He also calls attention to the papillæ on the head as tactile organs furnished with nerves from the fifth pair.

Dr. Theo. Tellkampf[‡] was the first to point out the existence of the rudimentary eyes from dissections made by himself and Prof. J. Müller, and to state that they can be detected in some specimens as black spots under the skin by means of a powerful lens. Prof. Wyman afterwards detected the eye through the skin in several specimens. Dr. Tellkampf also was the first to call attention to the "folds on the head, as undoubtedly serving as organs of touch, as numerous fine nerves lead from the trigeminal nerve to them and to the head generally."

It is also to Dr. Tellkampf that we are indebted for the first figure of the fish,[§] and for figures illustrating the brain and internal organs. The descriptions of the anatomy of the fish by Drs. Tellkampf and Wyman are all that have ever been written on the subject of any importance, with the exception of the description of the eye by Dr. Dalton, whose paper, in the *New York Medical Times*, vol. ii. p. 354, I have not seen. Prof. Poey gives a comparison of portions of the structure with that of the Cuban blind fishes.

Dr. Tellkampf proposed the name of *Heteropygii*[||] for the family of which, at the time, a single species from the Mammoth Cave was the only known representative, and makes a comparison of the characters with those of *Aphredoderus Sayanus*, a fish found only in the fresh waters of the United States, and belonging to the old family of Percoids, but now considered as representing a family by itself, though closely allied to the North American breams (*Pomotis*), and having the anal opening under the throat, as in the blind fish.

Dr. Storer,[¶] not knowing of Dr. Tellkampf's paper, proposed the name of *Hypsæidæ*, for the blind fish, and placed it between the minnow and the pickerel families, in the order of Malacopterygian, or soft-rayed fishes. According to the system adopted by Dr. Günther, it stands as closely allied to the minnows, *Cyprinodontidæ* (many of which are viviparous and have the single ovary and general character of the blind fish), and the shiners, *Cyprinidæ*, of the order of Physostomi. Dr. Tellkampf, in discussing the relations of the family, points out its many resemblances to the family of *Clupesoces*, and its differences from the Siluroids, Cyprinodontes, and Clupeoids, with which it has more or less affinity, real or supposed. Prof. Cope in his paper on the Classification of Fishes* places the *Amblyopsis* in the order of Haplomi with the shore minnows, pickerel and mud fish, and in an article on the Wyandotte Cave,† he says that the Cyprinodontes (shore minnows) are its nearest allies. This arrangement by Prof. Cope places the Haplomi between the order containing the herrings and that containing the electric eel of South America, all included with the garpike, dog fish of the fresh waters (*Amia*), cat fishes, suckers, and eels proper, &c. in the division of Physostomi as limited by him.

---

[*] Obtuse vision.

[†] Of a cave.

[*] *Silliman's Journal*, vol. 45, p. 94.

[†] Proceedings Boston Soc. Nat. Hist., vol. 4, p. 395. 1853.

[‡] Muller's Archiv. fur Anat., 1844, p. 392. Reprinted in the New York *Journal of Medicine* for July, 1845. p. 84, with plate.

[§] The only other figures of the species, that I am aware of, are the simple outlines given in Poey's "Mem. de Cuba," the woodcut in Wood's "Illustrated Natural History," and the cut in Tenney's "Zoology." None of these figures are very satisfactory.

[||] From the advanced position of the terminus of the intestine being so different from the position which it has in ordinary fishes.

[¶] "Synopsis of the Fishes of North America," published in 1846.

Prof. Agassiz‡ in 1851 stated that the blind fish was an aberrant form of the Cyprinodontes.

Thus all those authors who have expressed an opinion as to the position which the fish should hold in the natural system, have come to the same conclusions as to the great group, division, or order, into which it should be placed. For all the terms used above, when reduced to any one system, bring *Amblyopsis* into the same general position in the system; its nearest allies being the minnows, pickerels, shiners, and herrings; and unless a careful study of its skeleton should prove to the contrary, we must, from present data, consider the family containing *Amblyopsis* as more nearly allied to the Cyprinodontes, or our common minnows having teeth on the jaws, than to any other family, differing from them principally by the structure of the several parts of the alimentary canal and the forward position of its termination.

I have thus far mentioned only one species of blind fish from the cave, the *Amblyopsis spelæus*. The waters of the cave not only contain another species of blind fish, differing from *Amblyopsis* in several particulars, especially by its smaller size and by its being without ventral fins, which I have identified as the *Typhlichthys subterraneus* of Dr. Girard; but also a fish with well developed eyes, as proved by the account given by Dr. Tellkampf, and by the drawing of a fish found by Prof. Wyman, in 1856, in the stomach of an *Amblyopsis* he was dissecting. It is very much to be regretted that the specimen is not now to be found, and that it was so much acted on by the gastric juice as to destroy all external characters by which it could be identified from the drawing which Prof. Wyman made of it, which is of about natural size. Dr. Tellkampf remarks on the fish with eyes are as follows:—

"Besides the colourless blind fish, there are also others found in the cave, which are black, commonly known by the name of mud fish. I saw a dark-coloured fish in the water, but did not succeed in catching it. The latter are said to have eyes, and are entirely dissimilar to the blind fish."

The name "mud fish," given to this fish with eyes, and the statement that it is of a dark colour, together with the drawing by Prof. Wyman of the fish found in the stomach of the blind fish, showing the position of the dorsal fin to be the same as in the fish commonly called mud fish in the fresh waters of the Middle, Western, and Southern States, perhaps indicates the fish with eyes to be a species of *Melanura*. This fish is called mud fish from the habit of burying itself in the mud, tail first, to the depth of two to four inches, and of remaining buried in the mud in our western ditches during a time of drought. This habit, perhaps, in a measure fits it for a subterranean life. The occurrence of a fish belonging to the same family with the blind fish, but with well developed eyes, in the subterranean streams in Alabama, however, renders it probable that the cave fish with eyes may be the same or an allied species, and the drawing by Prof. Wyman would answer equally as well for it.

The fact that the *Amblyopsis* succeeded in catching a fish of probably very rapid and darting movements, shows that the tactile sense is well developed, and that the blind fish must be very active in the pursuit of its prey; probably guided by the movement which the latter makes in the water so sensibly influencing the delicate tactile organs of the blind fish that it is enabled to follow rapidly; while the pursued, not having the sense of touch so fully developed, is constantly encountering obstacles in the darkness.

In describing the habits of the blind fish, Dr. Tellkampf says:—

"It is found solitary, and is very difficult to be caught, since it requires the greatest caution to bring the net beneath them without driving them away. At the slightest motion of the water they dart off a short distance and usually stop. Then is the time to follow them rapidly with a net and lift them out of the water. They are mostly found near stones or rocks which lie upon the bottom, but seldom near the surface of the water."

Prof. Cope, in describing the habits of the blind fish which he obtained in a stream that passes into the Wyandotte Cave, though he entered it by means of a well in the vicinity of the cave, says that—

"If these *Amblyopses* be not alarmed they come to the surface to feed, and swim in full sight like white aquatic ghosts. They are then easily taken by the hand or net, if perfect silence be preserved, for they are unconscious of the presence of an enemy except through the sense of hearing. This sense is, however, evidently very acute, for at any noise they turn suddenly downward, and hide beneath stones, &c., at the bottom. They must take much of their food near the surface, as the life of the depths is apparently very sparse. This habit is rendered easy by the structure of the fish, for the mouth is directed upwards, and the head is very flat above, thus allowing the mouth to be at the surface."

The blind fish has a single ovary, in common with several genera of viviparous Cyprinodontes. In three female specimens of *Amblyopsis* which I have opened, the ovary was distended with large eggs, but no signs of the embryo could be traced. In these three specimens it was the right ovary that was developed, and this was by the side of the stomach, and did not extend beyond it. The number of eggs contained in the ovary was not far from one hundred in the specimen examined. As the embryos develop, the mass probably pushes further back in the cavity and also extends the abdominal walls. That this fish is viviparous is proved by the statement made by Mr. Thompson before the Belfast Natural History Society* that one of the blind fishes from the cave, four and a half inches long, "was put in water as soon as captured, where it gave birth to nearly twenty young, which swam about for some time, but soon died. These, with the exception of one or two, were carefully preserved, and fifteen of them are now before us (at the meeting, I wish they were here), they were each four lines in length."

It is singular that no mention is made regarding these young, as to the presence or absence of eyes, and, as if it was fated that this important point should remain unnoticed as long as possible, it is equally singular that Dr. Steindachner omitted to examine some very young specimens which he received from a friend a few months since and sent to the Vienna Museum, where they will remain unexamined until he returns there. I saw the Doctor only a week after these, to me, interesting specimens had been sent abroad, and he was as grieved as I was disappointed at my being just too late to take advantage of them.

At what time the young are born has never been stated, but judging from such data as I can at present command, I think that it must be during the months of September and October. Specimens collected during those months would probably contain embryos in various stages of development, the examination of which would undoubtedly lead to most interesting results.

---

* *American Naturalist*, vol. v. p. 579, 1871.

† *Indianopolis Daily Journal* of September 5, 1871. Reprinted in Ann. Mag. Nat. Hist., Nov. 1871.

‡ *Silliman's Journal*, p. 128.

* Annals and Mag. of Natural History, vol. xiii. p. 112, 1844.

The largest specimens I have seen of *Amblyopsis* are several males and females, each from four to four and a half inches in length, which seems to be about as large as the fish grows, though Dr. Günther mentions a specimen in the British Museum of five inches in length. The largest specimen captured of late years is said to have been taken during the summer of 1871, and sold for ten dollars to a person who was so desirous of securing the precious morsel that he had it cooked for his supper. The smallest specimen I have seen was one and nine-tenths inches in length.

F. W. PUTNAM

NOTES

ADDRESSES of sympathy with Dr. Hooker, in the difficult position in which he is placed with regard to the management of Kew Gardens, are flowing in on all sides, from those interested in the maintenance of Kew as a scientific establishment. At a meeting of the leading botanists and horticulturists held last week at the office of the *Gardener's Chronicle*, resolutions were unanimously passed expressing the sympathy of the meeting with Dr. Hooker, and in favour of an address to Mr. Gladstone, calling attention to the eminent services rendered by him to science, and pointing out that it is absolutely essential for the efficient management of the establishment at Kew that the Director must have complete control over the subordinate officials, free from any interference in matters of detail from his official superiors. The same course has been followed by the Council of the Royal Horticultural Society, and by its various committees. At a Council of the Royal Botanic Society, specially summoned for the purpose on Saturday last, similar resolutions were passed. The Council of the Meteorological Society has sent to Mr. Gladstone, Lord Derby, Sir John Lubbock, and Dr. Hooker, copies of a resolution in the same direction.

AN interesting *soirée* was held at the Royal Albert Hall on Thursday evening last, under the auspices of the Society of Telegraph Engineers, with the aid of the Postal Telegraph Department. A model of every kind of telegraph instrument which has been generally used for commercial purposes from the opening of telegraphs to the present time was exhibited. Each apparatus was connected up with wires proceeding from the central hall to the galleries, and thus the actual practical working of the telegraph system was made apparent to those present in a very effective manner. A descriptive lecture was at the same time given by Mr. W. H. Preece, of the Postal Telegraph Department, who lucidly explained the action of the electric current in producing the simple elementary signals. The admirable manner in which the lecturer made himself heard in every part of the vast assembly was a general subject of remark. The most interesting feature of the entertainment was the direct and instantaneous working with India. Kurrachee, the terminus of the Indo-European line in India, a distance of upwards of 5,000 miles, was the town selected, and, in reply to a message of inquiry, that station said, "Here, Kurrachee," and followed it up with the announcement that "locusts are swarming in Scinde." After the conversations held with India from the Albert Hall were concluded, the Grand Vizier of Persia, who was at Teheran, sent to the Albert Hall a warm message of congratulation to the Prince of Wales.

Les Mondes speaks with contempt and surprise of the treatment which science meets with at the hands of the British Government, referring particularly to the refusal of the latter to grant a sum for the purpose of enabling scientific men to make marine explorations on the coasts of Europe and India, and to the conduct of Mr. Ayrton towards Dr. Hooker. The latter is spoken of as a gentleman "eminent, talented, universally honoured for his integrity, loved for his courteous manner and the goodness of his heart, and who has devoted to the service of the State a life not only laborious but illustrious."

THE new French Association for the Advancement of Science intends to hold its first meeting at Bordeaux in the month of September next, commencing on the 5th.

WE are sorry to see the following paragraph in *Les Mondes* of July 18:—"No one has yet responded to the appeal we made to the French *savants* to take part in force (*en nombre*) in the Brighton meeting, which opens on August 14. We shall not organise this scientific excursion unless we are able to count upon a sufficient number of adherents. There is no time to lose." We hope it is not too late, and that something like a representative party may be yet organised from among all classes of French men of science. We are sure we can promise they will be heartily welcomed and hospitably treated at Brighton.

THE Annual Meeting of the British Medical Association will be held in Birmingham on the 6th, 7th, 8th, and 9th days of August next.

MR. W. A. TILDEN, D.Sc. Lond., Demonstrator of Practical Chemistry to the Pharmaceutical Society, has been appointed Chemical Master in Clifton College.

BY the provisions of the late Dr. William J. Walker's foundation, two prizes are annually offered by the Boston Society of Natural History for the best memoirs, written in the English language, on subjects proposed by a Committee appointed by the Council. For the best memoir presented, a prize of sixty dollars may be awarded; if, however, the memoir be one of marked merit, the amount may be increased, at the discretion of the Committee, to one hundred dollars. For the memoir next in value a sum not exceeding fifty dollars may be given; but neither of these prizes is to be awarded unless the papers under consideration are deemed of adequate merits. Memoirs offered in competition for these prizes must be forwarded on or before April 1, 1873, prepaid, and addressed, "Boston Society of Natural History, for the Committee on the Walker Prizes, Boston, Mass." Each memoir must be accompanied by a sealed envelope enclosing the author's name, and subscribed by a motto corresponding to one borne by the manuscript. The subject of the Annual Prize of 1873 will be "On the Development and Transformations of the Common House Fly."

THE Academy of Sciences and Belles Lettres of Caen has offered a prize of 4,000 francs for a paper on "The part played by leaves in vegetation." What is wanted is an account of exact experiments and new facts calculated to clear up, invalidate, confirm, or modify the doubtful points in the received theories. Papers must be sent in before December 31, 1875, addressed to M. Travers, secretary of the Academy, Caen.

ON Thursday last Mr. Thomas Baring, M.P., F.R.S., distributed prizes and certificates to the students who had passed the examinations connected with the educational courses of lectures delivered at the London Institution during the past session. In the examination on Prof. Huxley's lectures, "On the Physiology of Bodily Motion and Consciousness," the first prize was gained by H. B. Hyde, jun.; the second by Miss Caroline Lloyd; and the third by A. J. Wallis. In the examination on Dr. Odling's course, "On Elementary Chemistry," the first, second, and third prizes were carried off by H. Louis, A. J. Richardson, and Miss Eleanor F. Garrett. In the examination connected with the lectures "On the Theory of Music," delivered by Mr. E. J. Hopkins, the first prize was obtained by Alfred Hare, and the second by Miss Frances S. Voysey. In